APPENDIX B: SYSTEM ENGINEERING MANUAL GLOSSARY

TERM	DEFINITION
Acceptance Criteria	Various criteria that a system or component shall satisfy in order to be accepted by a user, customer, or other authorized entity.
Allocation	Top-down distribution of system-level requirements to the subsystem, element, component, or to the project team that delegated to meet the requirement. This approach tends to promote a top-down "system approach" in helping to establish specific design requirements for all levels of the system hierarchy as appropriate. The allocation process may be properly applied with reliability, maintainability, supportability, lifecycle cost, and related characteristics in mind. Allocation is also the assignment of performance requirements to functions.
Analysis	Logical examination or study of a system to determine the nature, relationships, and interaction of its parts and environment. Analysis emphasizes baseline system performance and/or compares development, production, or usage alternatives. Analysis is concerned with understanding the existing system and establishing the system requirements. Analysis is also a type of verification. It may be any kind of mathematical, computational, or logical task performed to verify a requirement that may not be verified in any other manner, including simulation and similarity analyses.
Article	Any product, including systems, subsystems, elements, components, or parts.
Availability	The probability that a system or constituent piece will be operational during any randomly selected instant of time, or, alternatively, the fraction of the total available operating time that the system or constituent piece is operational.
Behavior Diagram	Graphical representation of system dynamics that incorporates system responses to inputs. A type of functional flow diagram. The behavior diagram differs from functional flow diagrams in general in that behavior diagrams contain data flow and control elements. (See Functional Flow Diagram.)
Compliance	Determination that the requirements have been met.
Component	A part of the product being designed or produced.
Concept of Operations	Description of what is expected from the system, including its various modes of operation and time-critical parameters.
Configuration Item	Aggregation of hardware, software, processed materials, services, or any of its discrete parts that is demonstrated for configuration management and treated as a single entity in the configuration management process. (ISO)

TERM	DEFINITION
Configuration Management	A basic system engineering element. A management process for establishing and maintaining consistency of a product's performance, functional, and physical attributes with its requirements, design, and operational information through out its life. The CM program consists of CM functions associated with the following program elements: program management, design requirements, document control, change control, and assessments. (See Section 4.11, Configuration Management.)
Critical Design Review	Formal technical review of detail design documentation to establish compatibility with applicable requirements and interfaces and to identify specific engineering documentation required for release to production.
Data Dictionary	A definition of all system data representations in the system models that binds the models together.
Data Flow Diagram	Graphical means for modeling the processes that transform data in a system.
Decomposition	Partitioning/dividing a requirement into its lower-level discrete elements or parts.
Demonstration	Type of verification. Similar to test except that it does not require instrumentation.
Derived Requirements	Any requirement that is not explicitly identified by the Customer. For example: · Decision to select a separate power supply for equipment performing a specific function leads to derived safety requirements. · Architectural choices, such as selecting hydraulic versus electrical power, would have different consequences and different requirements for achieving the same objective. · Hardware-software interfaces.
Deviation	Specific, written authorization to depart from a particular requirement(s) of an item's current approved configuration documentation for a specific number of units or a specified period of time, and to accept an item that is found to depart from specified requirements, but nevertheless is considered suitable for use "as is" or after repair by an approved method. (A deviation differs from an engineering change in that an approved engineering change requires corresponding revision of the item's current approved configuration documentation, whereas a deviation does not allow a revision of the item's current approved configuration documentation.)
DOORS (Dynamic Object-Oriented Requirements System)	Commercial tool licensed to the FAA for capturing and managing requirements.

TERM	DEFINITION
Effectivity	Designation defining the point in time, an event, or a product range (e.g., serial, lot number, model, date) at which changes or variances to specific products are to be effected. The authorized and documented point of usage for a specific configuration of a part/ assembly/installation, etc.
Electromagnetic Compatibility	The ability of a system to function within its electromagnetic environment and, itself, not be a source of troublesome electromagnetic interference.
Electromagnetic Environment	Consists of the systems and other elements (such as humans and nature) that exist within the area that a given system is (or is to be) operated.
Electromagnetic Environmental Effects (E^3) Engineering	The technical discipline dealing with safe and efficient operation of electronic devices regarding radiated and conducted electromagnetic emissions.
Electromagnetic Pulse	An intense burst of electromagnetic interference caused by a nuclear explosion. Such a pulse may damage sensitive electronic systems or cause them to temporarily malfunction.
Electromagnetic Susceptibility	The weaknesses or lack of resiliency a system may have to certain electromagnetic conditions.
Electrostatic Discharge	An unintentional transfer of static electricity from one object to another.
Environment	Natural and induced conditions experienced by a system, including its people, product, and processes.
Failure Modes and Effects Analysis	An evaluation process for analyzing and assessing the potential failures in a system.
Failure Modes and Effects Criticality Analysis	An analysis method used to identify potential design weaknesses through a systematic analysis approach that considers all possible ways in which a component may fail (the modes of failure); possible causes for each failure; likely frequency of occurrence; criticality of failure; effects of each failure on systems operation (and on various system components); and any corrective action that may be initiated to prevent (or reduce the probability of) the potential problem from occurring in the future.
Function	Characteristic task, action, or activity that shall be performed to achieve a desired system objective (or customer need).
Functional Analysis	One of the basic elements of system engineering. A process for examining a system need to identify all the functions and subfunctions necessary to accomplish the system's operation or mission. (See Section 4.4, Functional Analysis.)
Functional Architecture	Hierarchical arrangement of functions and interfaces providing a complete representation of the system from a performance and behavioral perspective, as captured in the requirements set.

TERM	DEFINITION
Functional Baseline	Set of functions, functional interfaces, timelines, and requirement allocations established for a particular system.
Functional Configuration Audit	Review to verify the functionality of subsystems. These reviews are also part of the reviews designed to accomplish certification.
Functional Decomposition	Approach to reducing functional complexity by allocating functionality and interfaces to sublevel functions, which are more readily understood and managed.
Functional Flow Diagram (or Functional Flow Block Diagram)	Multi-tier, time-sequenced, step-by-step diagram of the system functional flow. (See also Behavior Diagram.)
Functional Interface	Logical or physical association between functions that allows transmission of a quantity across a boundary. Quantities may include electrical, hydraulic, and pneumatic power; mechanical forces and torques; gases; heat; vibration, shock, and loads; data; and other quantities.
Functional Requirements	Requirements necessary to obtain the desired performance of a system under the conditions specified.
Hazardous Material Management/Environmental Engineering	The mechanism applied within the system engineering process to ensure a program's ongoing compliance with applicable environmental laws. It is also the process designed to provide early, pre-deployment planning and coordination to minimize the negative impacts that site-specific environmental conditions may have on a program's operability.
High-Level Requirements	Requirements applicable to the highest tier of the system architecture.
Human Factors Engineering	A multifaceted discipline that generates information about human requirements and capabilities, and applies it to the design and acquisition of complex systems.
"ilities"	Specialty functions that contribute to the design, manufacture, and acceptable performance of the product (e.g., elements of specialty engineering: reliability, maintainability, human engineering, safety, supportability, etc.).
Inspection	Type of verification method. Verification of a requirement by visual examination.
Integrity of Analyses	One of the basic elements of system engineering. A disciplined process applied throughout a program to ensure that analyses provide the required levels of fidelity, accuracy, and confirmed results in a timely manner. Integrity is ensured by competent users iteratively applying a validated set of tools to a clearly defined data set.
Integration	Bottom-up process of system buildup. The task of ensuring that all items work together individually and collectively as a group or as a whole system.

TERM	DEFINITION
Interface	Functional and physical connection at a boundary. (See Section 4.7, Interface Management.)
Interface Control Document	Document that provides basic information about interfaces between two elements, including type of interface (electrical, pneumatic, hydraulic, etc.) and the interface characteristics (functional or physical).
Interface Requirements Document	Document that provides FAA interface requirements between two elements, including type of interface (electrical, pneumatic, hydraulic, etc.) and the interface characteristics (functional or physical).
Lifecycle	Entire spectrum of activity for a given system, commencing with the identification of a need and extending through system design and development, production and/or construction, operational use, sustaining support, and system retirement and phaseout.
Maintainability	The measure of the ability of a system or constituent piece to be retained in, or restored to, its fully operational status. It is generally characterized by the Mean-Time-To-Restore.
Master Verification Plan	Plan describing the overall verification program. (See Section 4.12, Validation and Verification.)
Mean-Time-Between-Failure	The basic measure of reliability for repairable systems or constituent pieces. MTBF is the mean number of life units during which all parts of the system or constituent piece perform within their specified limits, during a particular measurement interval under stated conditions.
Mean-Time-To-Restore	The total elapsed time from initial failure to resumption of operation.
Mission Need Statement	Documentation of needs that is approved at JRC 1.
Model	Representation of an actual or conceptual system that involves mathematics, logical expressions, or computer simulations that may be used to predict how the system might perform or survive under various conditions or in a range of hostile environments. (See Simulation.)
N^2 Diagram	Visual matrix representing functional or physical interfaces between system elements.
Nonconformance	Failure of a unit or product to conform to specified requirements.
Operational Requirements Document	Top-level requirements document normally provided by the customer. It is the intent of the document to specify the requirements for all the operational aspects of the system.
Part	One, two, or more pieces joined together to make a component; these pieces are not normally subject to disassembly without destruction or impairment of designed use.

TERM	DEFINITION
Performance	Quantitative measure characterizing a physical or functional attribute relating to the execution of an operation or function. Performance attributes include quantity (how many or how much), quality (how well), coverage (how much area, how far), timeliness (how responsive, how frequent), and readiness (availability, mission/operational readiness). Performance is an attribute for all systems, people, products, and processes, including those for development, production, verification, deployment, operations, support, training, and disposal. Thus, supportability parameters, manufacturing process variability, reliability, and so forth are all performance measures.
Physical Architecture	Hierarchical arrangement of hardware and/or software components along with associated interfaces depicting the physical definition of the system.
Physical Configuration Audit	Review to determine whether the aircraft was built in accordance with the drawings reviewed at the Critical Design Review. In addition, the audit fulfills the requirements of the audit requirements of certification.
Preliminary Design Review	Formal technical review of initial design concepts and documentation to establish compatibility with applicable requirements and to further define physical and functional interface requirements.
Product	Whole system or process being designed or produced.
Quality Function Deployment	Method for capturing and delineating requirements based on identifying what is desired by the customer or stakeholder, along with how that desire may be satisfied.
Record	Information or data on a particular subject that is collected and input into a system for electronic storage.
Reliability	Ability of a system and its parts to perform its mission without failure, degradation, or demand on the support system. It is generally characterized by the Mean-Time-Between-Failure.
Requirements Analysis	Basic element of the system engineering process. (See Section 4.3, Requirements Management.)
Requirements Document	Collection of requirements and related information/attributes presented in a user-defined format. These documents, when output from the Requirements Management process, are called requirements documents. Examples of requirements documents are an initial Requirements Document, final requirements document , discrete performance and procurement specifications, and requirements traceability matrices.
Risk	Undesirable situation or circumstance that has a realistic probability of occurring and an unfavorable consequence. (See Section 4.10, Risk Management.)
Rule	Standard procedure that governs a task or record through its lifecycle.

TERM	DEFINITION
Similarity	Type of verification by analysis. Applicable to components and subsystems similar in characteristics and usage to those on previous systems. In principle, there are no parts of the subject subsystem more at risk (due to environment or installation), and operational stresses are no more severe than on previous systems.
Simulation	Type of verification by analysis. The verification of a system requirement by a computer simulation or other technique. Simulation also includes hardware-in-the-loop simulations. Execution of a system model to examine the response of the system to injected inputs, usually performed before development of system hardware and software.
Stakeholder	Entity (e.g., person, team, or product) that is responsible for or in some way has a vested interest in the requirement or product under consideration.
State Transition Diagram	Graphical means of modeling the dynamic behavior of a system by depicting the legal states that the system may assume.
Structured Analysis	Disciplined approach to defining a system using a graphical box-and-arrow diagramming language.
Synthesis	A basic element of the system engineering process. A process for identifying one or more physical solutions or embodiments of functionality identified in the Functional Analysis process and associated requirements set. (See Section 4.5, Synthesis, and Section 4.6, Trade Studies.)
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services, and other support facets.
System Design Review	A review of the overall system configuration in lieu of or in addition to individual reviews of equipment items, software, and other system components. The system design review covers: 1) Functional analysis and allocation of requirements 2) Development, process product, and material specifications 3) Design data defining the overall system (layouts, drawings, parts/material lists, supplier data) 4) Analyses, reports predictions, tradeoff studies, and related design documentation 5) Assessment of the proposed system design configuration in terms of technical performance measures 6) Individual program/design plans

TERM	DEFINITION
System Environment	All elements and interfaces external to a system from which the system receives inputs and to which the system delivers outputs.
System Engineer	Individual who concentrates on the design and application of the whole (system), as distinct from the parts, and who looks at a problem in its entirety, taking into account all the facets and all the variables and relating the social to the technical aspects.
System Requirements Review	A review to verify that all the top-level requirements are correct; that is, that they meet with customer approval. Another review function is to present to the customer those "assumed" requirements that have been developed throughout the requirements development.
Technical Performance Measurement	Continuing verification of the degree of anticipated and actual achievement of technical parameter growth toward expected values.
Test	Type of verification that requires instrumentation. Includes both laboratory and flight tests.
Thread	A system input, system output, description of the transformations to be performed, and the conditions under which these transformations are to occur.
Time-Critical Functions	Functions that affect reaction time, downtime, or system availability.
Time-Critical Requirement	An identified, temporal constraint on or characteristic of the system.
Time Line Analysis	Graphical representation that considers functional duration and provides a description of the functional sequences for operation, test, and maintenance functions.
Time Line Sheet	Used to perform and record the analysis of time-critical functions and functional sequences.
Traceability	Characteristic by which requirements at one level of design may be related to requirements at another level. Traceability also encompasses the relationship between a performance requirement and the function from which the performance requirement was derived.
Trade Study	Analysis conducted to determine the preferred option, given two or more options. Trade studies may be either top-level or subsystem-level.
Validation	Determination that the requirements for a product are sufficiently correct and complete. (See Section 4.12, Validation and Verification.)
Variance	Specific, written authorization to depart from a particular requirement(s) of a product's current approved configuration documentation for a specific number of units or a specified period of time. (A variance differs from an engineering change in that an approved engineering change requires corresponding revision of the product's current approved configuration documentation, whereas a variance does not.)

TERM	DEFINITION
Verification	Evaluation of an implementation [system] to determine that applicable requirements are met (See Test, Demonstration, Analysis, and Inspection. Verification for a given requirement may include one or more of these methods. See Section 4.12, Validation and Verification.)
Verification Readiness Review	A review conducted to ensure that all system engineering considerations are satisfied and that the readiness of all support, test, and operational systems is in order to perform the Verification process. The review includes a detailed examination of the status of the facilities, ground support equipment, Verification design, software, procedures, and Verification Requirements. In addition, it outlines Verification activities and schedules and identifies organizational/personal responsibilities. The review emphasizes ensuring that all Verification Requirements identified for each Verification method or technique are included in the Verification design and procedures.
Verification Requirements Traceability Matrix	Matrix correlating requirements and the associated verification method(s). (See Section 4.12, Validation and Verification.)
Waiver	Written authorization to accept an item, which during manufacture, or after having been submitted for inspection or acceptance, is found to depart from specified requirements, but nevertheless is considered suitable for use "as is" or after repair by an approved method.
Working Groups	Cross component groups chartered with the task of working process, design, and development tasks for any common system.